Appl. No. 09/601,004
Amdt. dated September 20, 2004
Reply to Office action of April 20, 2004

In the Claims:

Claims 1 and 7 are amended herein. The remaining claims are not amended.

1. (currently amended) A two variable data interpolation system for processing image data, ~~comprising a computer,~~ wherein ~~a~~ an image value between a plurality of discrete image data values is interpolated by performing convolution operation corresponding to the plurality of discrete data positioned at equal intervals in a two dimensional space using a sampling function that ~~can be differentiated~~ is differentiable finite times and has values of a local support.

2. (previously presented) The two variable data interpolation system according to claim 1, wherein the sampling function is a function that can be differentiated only once over a whole region.

3. (previously presented) The two variable data interpolation system according to claim 1, wherein, with letting a third order B spline function be F(t), the sampling function, (H(t), is defined as follows:

$$H(t) = -F(t + 1/2)/4 + F(t) - F(t - 1/2)/4.$$

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4. (previously presented) The two variable data interpolation system according to claim 3, wherein the third order B spline function F(t) is expressed as follows:

$$(4t^2 + 12t + 9)/4 \qquad ; -3/2 \le t < -1/2$$
$$-2t^2 + 3/2 \qquad ; -1/2 \le t < 1/2$$
$$(4t^2 2 - 12t + 9)/4 \qquad ; 1/2 \le t < 3/2.$$

5. (withdrawn) The two variable data interpolation system according to claim 1, wherein the sampling function is defined as follows:

$$(-t^2 - 4t - 4)/4 \qquad ; -2 \le t < -3/2$$
$$(3t^2 + 85 + 5)/4 \qquad ; -3/2 \le t \quad -1$$
$$(5t^2 + 12t + 7)/4 \qquad ; -1 \le t < -1/2$$
$$(-7t^2 + 4)/4 \qquad ; -1/2 \le t < 1/2$$
$$(5t^2 - 12t + 7)/4 \qquad ; 1/2 \le t < 1$$
$$(3t^2 - 8t + 5)/4 \qquad ; 1 \le t < 3/2$$
$$(-t^2 + 4t - 4)/4 \qquad ; 3/2 \le t \le 2.$$

6. (previously presented) A two variable data interpolation system, wherein a value between a plurality of discrete data is interpolated by performing convolution operation corresponding to the plurality of discrete data positioned at equal intervals in a two dimensional space using a sampling function that is differentiable finite times and has values of a local support,

wherein, with letting a third order B spline function be
F(t), the sampling function, (H(t), is defined as follows:

H(t) = -F(t + 1/2)/4 + F(t) - F(t - 1/2)/4, comprising:

discrete data extracting unit for extracting a plurality of
discrete data that exist within a predetermined range around a
data interpolating position that becomes an object of
interpolation operation;

sampling function operating unit for calculating a value of
the sampling function H(t) for each of a plurality of discrete
data extracted in this manner, with letting distance between the
data interpolating position and discrete data be a t; and

convolution operating unit for obtaining a value of the data
interpolating position by performing convolution operation
through adding values of the sampling function that are
calculated by the sampling function operating unit and correspond
to the plurality of discrete data respectively.

7. (withdrawn) A two variable data interpolation system,
wherein a value between a plurality of discrete data is
interpolated by performing convolution operation corresponding to
the plurality of discrete data positioned at equal intervals in a
two dimensional space using a sampling function that is
differentiable finite times and has values of a local support,

wherein the sampling function is defined as follows:

$(-t^2 - 4t - 4)/4$; $-2 \leq t < -3/2$

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$$(3t^2 + 85 + 5)/4 \qquad ; -3/2 \leq t \, -1$$

$$(5t^2 + 12t + 7)/4 \qquad ; -1 \leq t < -1/2$$

$$(-7t^2 + 4)/4 \qquad ; -1/2 \leq t < 1/2$$

$$(5t^2 - 12t + 7)/4 \qquad ; 1/2 \leq t < 1$$

$$(3t^2 - 8t + 5)/4 \qquad ; 1 \leq t < 3/2$$

$$(-t^2 + 4t - 4)/4 \qquad ; 3/2 \leq t \leq 2, \text{ comprising:}$$

discrete data extracting unit for extracting a plurality of
discrete data that exists within a predetermined range around a
data interpolating position that becomes an object of
interpolation operation;

sampling function operating unit for calculating the
sampling function H(t) for each of a plurality of discrete data
extracted by the discrete data extracting unit, with letting
distance between the data interpolating position and each
discrete data be a t; and

convolution operating unit for obtaining a value of the data
interpolating position by performing convolution operation
through adding values of the sampling function that are
calculated by the sampling function operating unit and correspond
to the plurality of discrete data respectively.

8.   (previously presented) A two variable data
interpolation system, comprising:

discrete data extracting unit for extracting a plurality of
discrete data that exist within a predetermined range around a

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data interpolating position that becomes an object of

interpolation operation;

sampling function operating unit for calculating a value of

the sampling function that can be differentiated finite times and

has values of local support for each of a plurality of discrete

data extracted in this manner, based on distance between the data

interpolating position and discrete data; and

convolution operating unit for obtaining a value of the data

interpolating position by performing convolution operation

through adding values of the sampling function that are

calculated by the sampling function operating unit and correspond

to the plurality of discrete data respectively.